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[Second Edition.]

PATENT SPECIFICATION

Application Date: March 12, 1926. No. 6929/26. 259,824

Complete Accepted: Oct. 21, 1926.

COMPLETE SPECIFICATION.

An Improved Heat Exchange Plate.

I, FRANK BERNHARD DEHN, M.Sc., Ph.D., A.I.C., F.C.P.A., of Kingsway House, 103, Kingsway, London, W.C. 2, a British subject, do hereby declare the nature of this invention (which has been communicated to me by August Jacobi, A.G., a Joint Stock company, organised under German law, of Darmstadt, Germany), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to heat exchange plates applicable particularly to soap cooling machinery.

Various forms of heating and cooling plates are known in the art, and it is sometimes the practice to construct these from cast iron with rods and tubes of wrought iron. It has been found that in certain cases many advantages exist when pressed parts are employed in their construction.

In one such known construction, a series of straight and parallel trough shaped depressions were pressed into a metal sheet, to which, by means of a frame, a cover plate was attached the cover plate contacting along the depressions to form passages for the heating or cooling agent. In a modification both the plates were similarly pressed and assembled together so that the depressions in one would contact along those of the other. In both cases, separate guide strips were provided for forming with the space between the depressions a sinuous path for the heating or cooling agent.

In another construction, two plates were provided with a sinuous trough like depression, the depressions in each registering when the plates were assembled, so as to form a sinuous path for the heating or cooling agent.

According to the present invention, however, the heating or cooling plate embodies two or more pressed metal plates provided with projection ribs or walls, said plates being so assembled that the projecting ribs or walls upon one plate or set of plates will lie between those of the other in order to provide a sinuous path for the heating or cooling medium.

Various forms of the invention are illustrated in the accompanying drawings, wherein:—

Fig. 1 is a plan view of the complete heating or cooling plate with the cover plate removed.

Fig. 2 is a section on line A—B Fig. 1.

Fig. 3 is a section on line C—D Fig. 1.

Fig. 4 is a detail of construction shown in enlarged part section.

Fig. 5 is a vertical section of a passage through the device for carrying the medium to be acted upon.

Fig. 6 is a plan view with the cover plate removed of a modified form of construction.

Fig. 7 is a section on line A—B Fig. 6.

Fig. 8 is a section on line C—D Fig. 6.

Fig. 9 is an enlarged section through the frame of the device.

Fig. 10 is a plan view of a modified form of frame.

Fig. 11 is a section of line A—B Fig. 10.

Fig. 12 is an enlarged and detailed section on part of line A—B Fig. 10.

In Figs. 1 to 3 two metal plates *a* are pressed out with a plurality of ribs *g* extending from one side of each plate and rising to the surface near the opposite side, thus forming a series of troughs open at one end and rising to the surface at the other. These two pressed out plates are assembled together so that the ribs of one alternate with those of the other, the open end of the troughs of one plate being on the opposite side of the device to those upon the other plate. The edges of the two plates are seamed together by welding, or any other suitable way.

In Figs. 3 and 4, a reinforcement *e* is shown placed in the open end of each

trough and held in place by means of a screw or bolt *h* or by welding or the like.

The last rib at one end of each plate is preferably shorter than the remainder (i.e. rises to the surface nearer the middle of the plate) and the remaining space is pierced to receive a canal *d* for the passage of the medium to be acted upon, said canal, passing through the cooler without communicating with the interior. In Fig. 5 thereof it is shown as being in the form of a truncated cone, two flanged tubular and conical portions being pressed together concentrically in opposite relationship with each other and attached to the top and bottom plates *a* respectively.

The plates *a* are each provided with depressions *f* to facilitate welding or the like of the various parts such as the plates *a* and cover plates *b*.

It will now be seen that a fluid entering the device by an opening such as *x* (Figs. 6 & 7) for example, will pass under the cover plate *b* in a sinuous path and leave the device by an opening at the other end, for example *y* (Figs. 6 & 7) the ribs acting as baffles to divert the flow of fluid.

Figs. 6, 7, 8 and 9 show a modified form of construction wherein metal plates *k* are provided with stamped out walls *m*, arranged substantially as above described.

If desired the ribs 9 may extend the whole width of the device and be provided with perforations at suitable places so that fluid may enter at one end and leave at the other, to assist in the heat exchange.

The three parts of the heat exchange plate, namely, the frame, the cooling portions and the cover plates may be attached together in any suitable manner. For example, as shown in Figs. 7, 8 and 9, the cooling portions *k* of the passages are bent up at their edges so as to form a peripheral recess between the portion *n* of the portions *k* and the frame *l* and a cover plate *i* to facilitate welding or the like.

The frame *l* may be of any form and may be constructed from pressings as in Figs. 10, 11, and 12. In this case, the frame comprises channel shaped portions U, provided with suitable stiffeners V.

The various hollow portions of the frame may either be left empty or they may be filled with any suitable material or otherwise utilised to facilitate the heat exchange.

However, other forms of frame may be employed without departing from the scope of the invention. Furthermore it will be readily apparent that the apparatus heretofore described is equally adaptable for both heating and cooling and that the apparatus is therefore to be regarded as a heat exchanging device.

The cooling plate is adapted for cooling materials of a soap like nature, i.e. in addition it may be employed to cool fats, tallow, paraffin, chocolate and the like.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A heat exchange plate wherein two or more pressed out metal plates are provided with projecting ribs or walls, said plates being so assembled that the projecting ribs or walls upon one plate or set of plates will lie between those of the other in order to provide a sinuous path, for the heating or cooling medium.

2. A heat exchange plate according to Claim 1 wherein the ribs are provided with reinforcing means.

3. A heat exchange plate, according to Claim 1 or 2 wherein the impressed ribs or walls act as stiffeners of the plates and form passages for the cooling or heating agent, and recesses for reinforcements.

4. A heat exchange plate according to any of the preceding claims, wherein depressions are pressed into the said parts to facilitate welding or the like.

5. A heat exchange plate according to any of the preceding claims, wherein a canal, for the passage of the medium to be acted upon, is made up from oppositely arranged conical tubes pressed into each other.

6. A heat exchange plate according to any of the preceding claims, wherein the device is provided with cover plates through which passes a canal for the passage of the medium to be acted upon.

7. A heat exchange plate according to any of the preceding claims, having a frame formed of pressed metal adapted to receive stiffening means.

8. A heat exchange plate according to any of the preceding claims wherein the pressed plates are bent up at one or more of their edges to facilitate welding them to the frame and cover plates.

9. A heat exchange plate, substantially as described or as illustrated in the accompanying drawings.

Dated this 12th day of March, 1926.

FRANK B. DEHN,
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[Wt. 67A—50/12/1927.]

2nd Edition

Fig. 1.

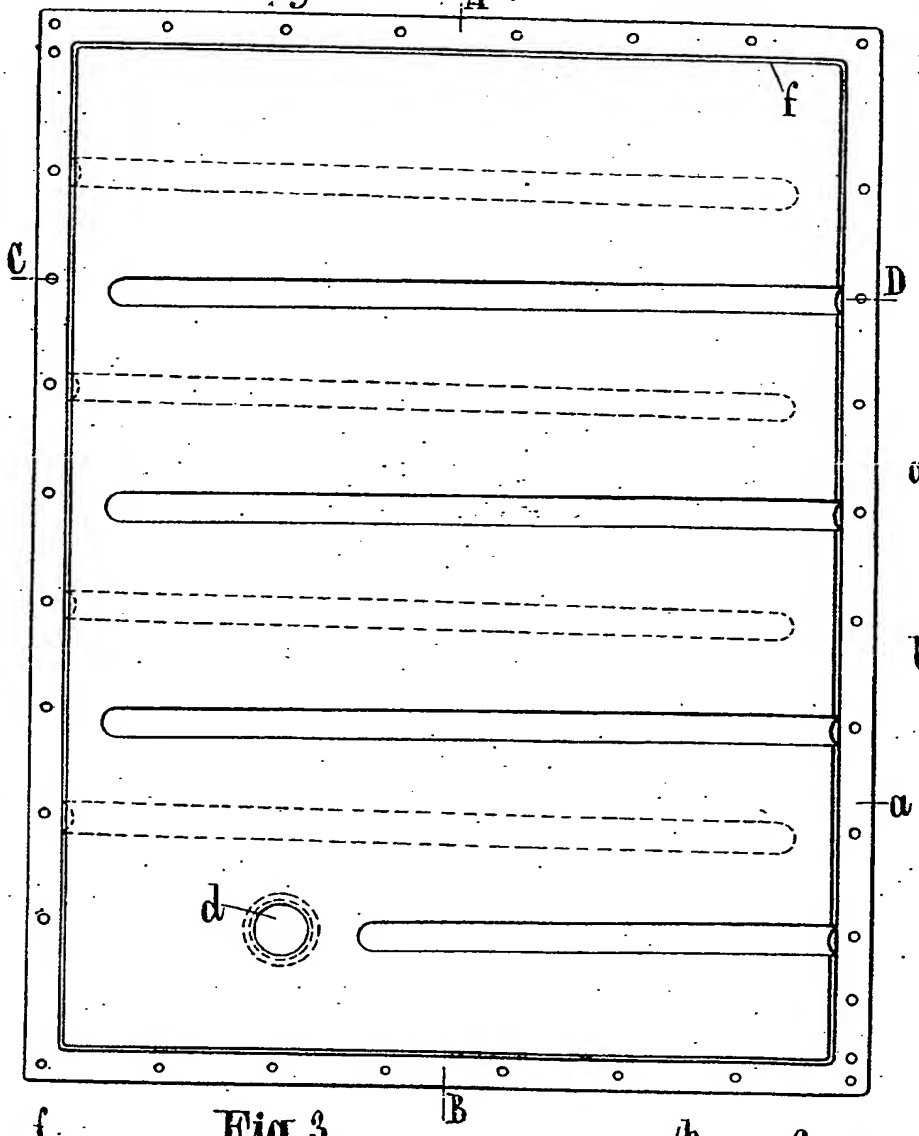


Fig. 2.

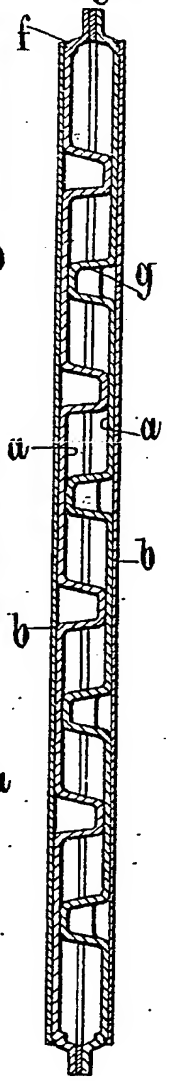


Fig. 3.

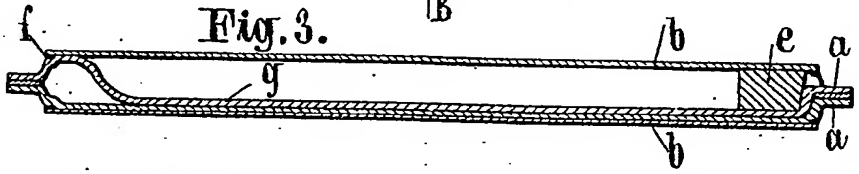


Fig. 4.

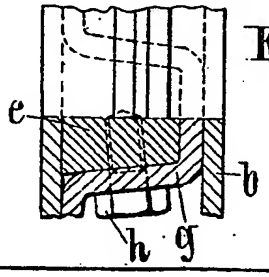


Fig. 5.

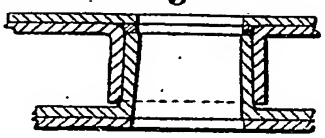
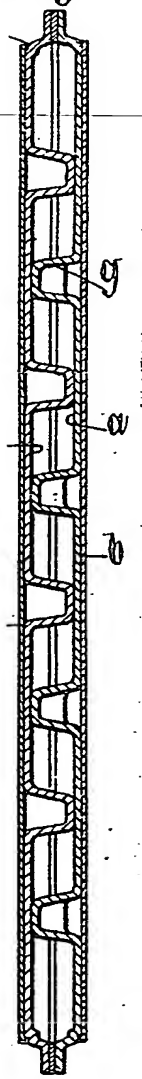


Fig. 2.



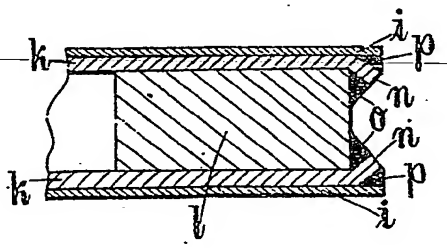
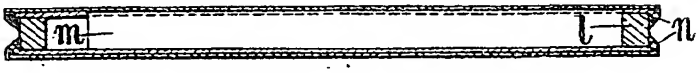


Fig. 9.

Fig. 8.



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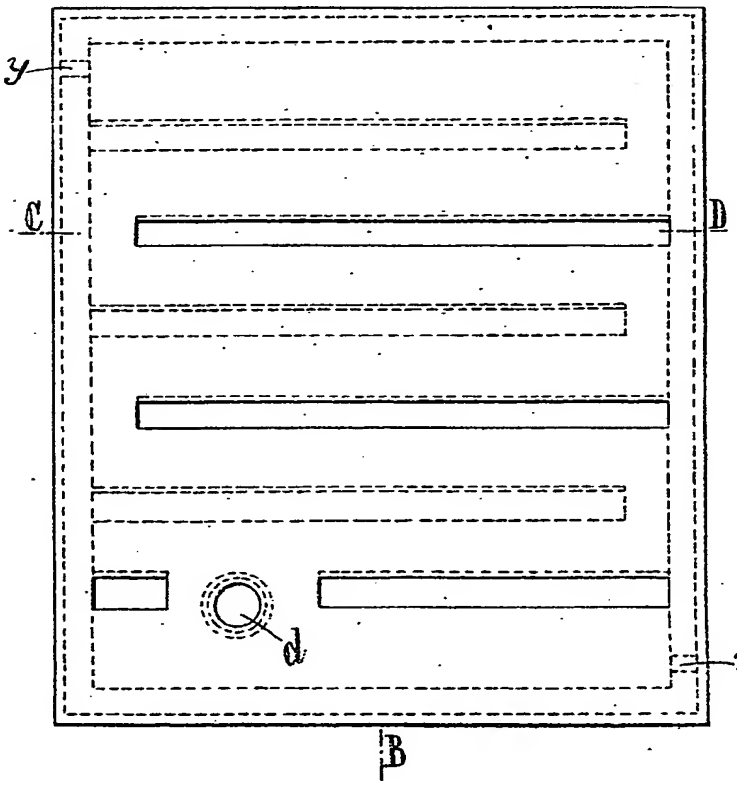
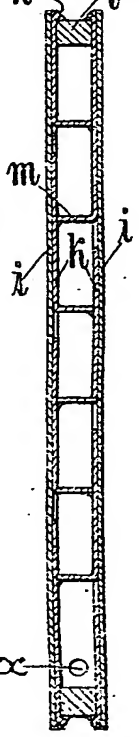


Fig. 7.



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259,824 COMPLETE SPECIFICATION

3 SHEETS
SHEET 2

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SHEET 1

Fig. 1.

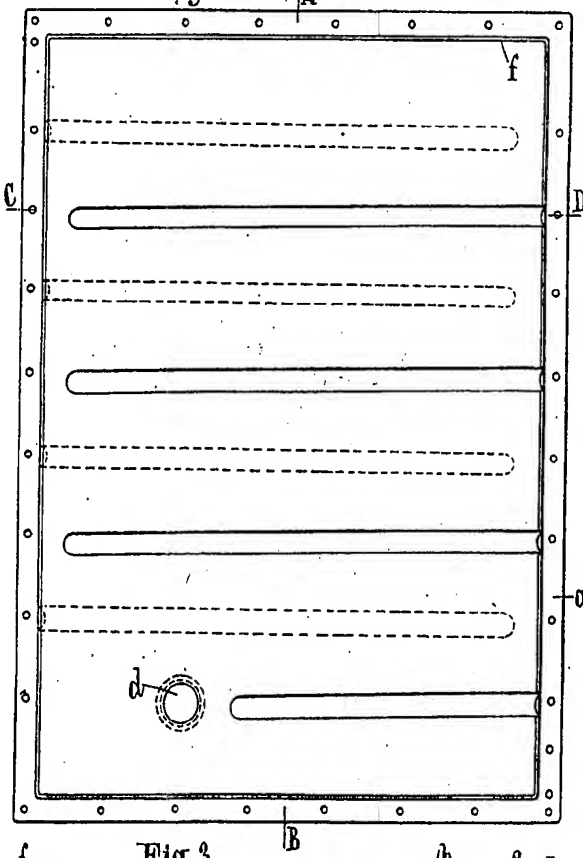

Fig. 2.

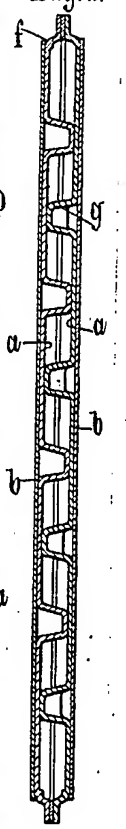

Fig. 3.

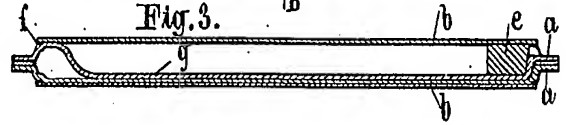

Fig. 4.

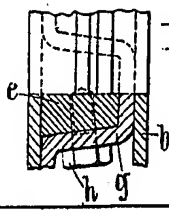

Fig. 5.

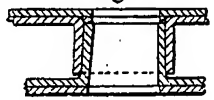

Fig. 9.

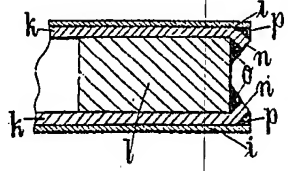

Fig. 8.

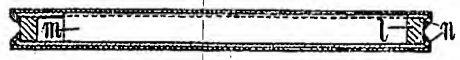

Fig. 6.

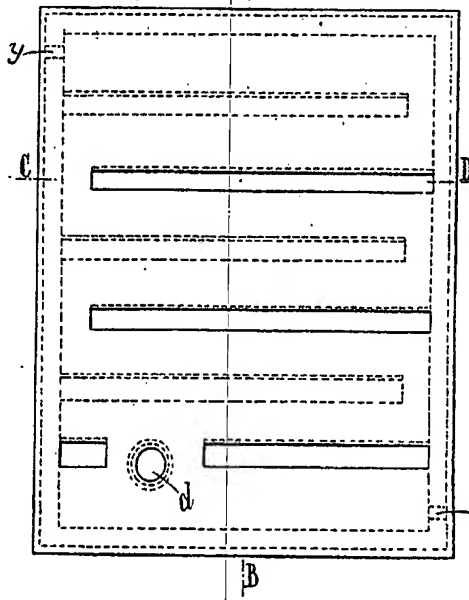

Fig. 7.

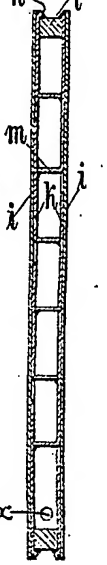

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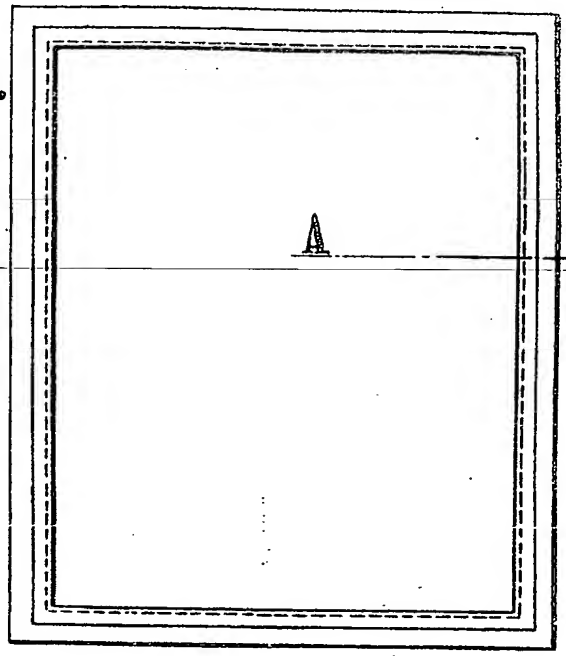
Fig. 10.



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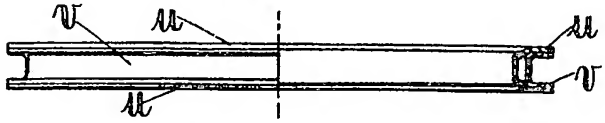

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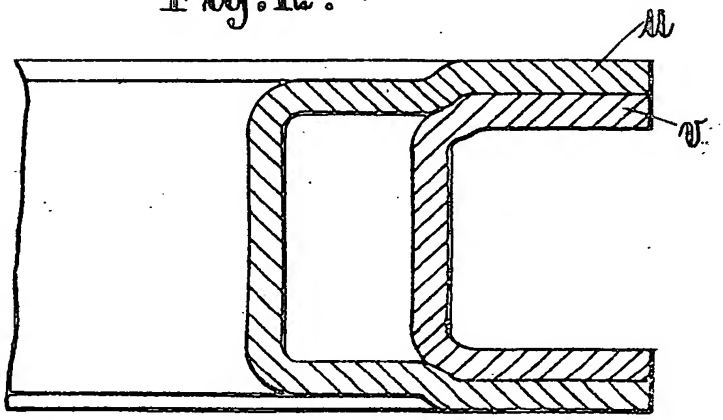

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